

SCIENCE

FRIDAY, MAY 18, 1888.

THERE IS NOW PENDING before Congress a proposition to enable the United States Geological Survey to carry on the agricultural work provided for by law. This movement was brought formally forward by the California State Grange in October, 1887. It is hardly necessary to dwell upon the desirability of collecting data as to the agricultural value of land. Work of this kind has been done in the States east of the Mississippi by State surveys and other institutions, but west of it Powell's report on the arid lands is almost the sole attempt. The work falls properly under the scope of a geological survey, as in this case it requires only little additional work to the topographical and geological surveys that are continuously going on, while under any other department it would require the organization of a new survey, and involve great expense. How much good work can be done by geologists in this line, is shown by the work of a number of State surveys, and outside the United States by the survey of Newfoundland, which carries on also the work of the land-office, and by several reports by members of the Canadian Geological Survey, who, in the maps showing the results of their reconnaissances, embody much that is of the greatest value to the farmer. As a matter of fact, the surveyors of the land-office in the United States as well as in Canada report in a general way on the character of the country, but general statements of this kind are not what is wanted. Information on the character of the land ought to be as definite as possible. If the lands were properly classified as to their agricultural, pastoral, and industrial value, the new settler would find at once the place suitable to his demands, the farmer would know how he can best develop the resources of his land, and great profit would thus accrue to the country in general. We print in another place an article by Professor Hilgard which shows the close relation between geological and agricultural conditions, and thus proves that the agricultural survey is properly a subdivision of the Geological Survey.

THE INTERNATIONAL COPYRIGHT BILL prepared by Senator Chace has been passed by the United States Senate, and it is understood that the leaders of the House of Representatives intend to give it a chance in that body before the close of the present session. This is good news to American authors, publishers, and to all classes of mechanics engaged directly or indirectly in the manufacture of books. A few English authors and some English mechanics are greatly excited over what is known as the 'manufacturing clause' of the bill, which requires that foreign books copyrighted in this country shall be immediately published here, and printed from type set up here; and the English printers have appointed a committee to secure the amendment of the bill if possible. The authors who have been loudest in their protests have been those, so says a cable-despatch to the *Philadelphia Press*, who have never had one of their books republished in this country, either with or without their consent; those whose works are popular enough to find a market in the United States being willing to submit to the extra tax which a separate edition for America subjects them to, in consideration of great advantages which the bill will confer upon them in enabling them to prevent pirating of their works in this country, and placing them in position to make terms with American publishers. The English printers and other mechanics fear, that, if the Chace bill becomes a law, many books copyrighted on both sides of the At-

lantic will be printed from plates made in America, and that their business will therefore be injured. It is only necessary to say, that, without the 'manufacturing clause,' no international copyright bill would be likely to be passed by the American Congress in the next ten years. Without it, the Chace bill would not even have been considered during the present session. We hope the time will soon come when the people of both countries will see their interest in unconditional copyright in both for the literary productions of the citizens of either, and the freest competition in the manufacture of books that are read on both sides of the Atlantic. Then authors will be allowed to have their books printed in London, or New York, or Chicago, as may be most convenient or advantageous, and readers will know that they are not paying unnecessarily high prices for their reading-matter.

THE SUCCESS of the 'land in severalty' law as an agency for the civilization of the Indians depends upon many conditions, some of which are little understood by legislators, or even by the officials of the Indian service. "Cannot the government protect a man from lazy Indians who eat up his crops?" asked an intelligent member of a South-western tribe of a white man whose acquaintance he had made. A little questioning disclosed the fact that this Indian had planted ground and raised some corn. About the time the crop was ready to gather, his wife's brother arrived for a visit, and brought his whole family, and showed no inclination to go away as long as the corn lasted. His white friend asked him why he did not turn them away, but he said he could not. And this was a result of a state of society over which no individual Indian has control, but which is appreciated by very few white men. An Indian is just as much bound to share his provisions with his relatives or the members of his clan, if they desire it, as to furnish food for his children. This man saw the injustice of this, but knew no way to escape it without the help of the government. There are 'lazy Indians' in every tribe, and the industrious ones are certain to have as many visitors as they can accommodate, and the overflow will camp in the front yard. How many white farmers trying to get a start in life, even if the land was given to them, would succeed under such circumstances? Another obstacle to the success of the 'land in severalty' experiment is the natural indolence of the Indians, — an indolence that is hereditary, and the necessary result of the kind of life which the present generation and their ancestors have led. "The white man gets up and goes to work before it is light, but an Indian never wakes up until he is hungry," said a native of the Indian Territory twenty years ago; and the policy that does not recognize this fact, and seek to overcome the indolent habits rather than to destroy them by force or by placing the Indian in unequal competition with white men, is unscientific, and will certainly fail. The only hope that good will come of the severalty law, therefore, is in the execution of it with discretion, and in postponing the settlement of Indians upon lands of their own until they are prepared for it. It may be necessary, also, to protect industrious Indians from impositions by all of their own and their wives' relations.

THE SELECT COMMITTEE of the Senate of the Dominion of Canada, appointed to inquire into the value of the country north of the Saskatchewan watershed, has presented a report which is founded on a vast amount of new and valuable information. The inquiry shows that much of this region, which was considered a few years

ago part of the uninhabitable polar regions, may become settled in course of time, as it possesses considerable natural resources. The great length of navigable rivers facilitates communication. The extent of continuous lake coast and river navigation is estimated at 6,500 miles, broken only in two places there situated upon the Great Slave and Athabasca Rivers. It is stated that there is a pastoral area of 860,000 square miles, arable lands to the extent of 274,000 square miles, while 400,000 square miles are considered useless for cultivation and stock-raising. The climate of this region is described as more favorable, as is generally assumed, and comparable in certain districts to that of western Ontario. It appears that there is an abundance of fish, and an ample supply of wood suitable for building-purposes. Among the mineral products, special attention is called to the extensive auriferous area and to the large petroleum-fields. The energetic attempts of Canada to develop the resources of the country have led to an increase of immigration to their western provinces. Undoubtedly the present inquiry will help to direct attention to the resources of those remote regions.

ECONOMY OF FOOD.

IN February we sent out from the office of *Science* a circular letter to a number of physicians, political-economists, and others likely to be posted and interested in the economy of food. In this letter we called attention to Prof. W. O. Atwater's article on the subject in the *Century* for January, and stated that it is generally believed that even those who wish and try to economize in the purchase and use of food very often do not understand how, and that while they consult carefully the prices they pay, and judge from these the nutritive value of the articles, they are frequently misled.

Our questions sought for information as to the existence of a considerable tendency among people of moderate means to bad economy in the following respects: first, in the purchase of food either of needlessly expensive kinds or ill-balanced quantities; second, in the cooking of food; third, in the actual waste of food, that is, the throwing-away of nutritious material instead of consuming it economically; finally we asked for suggestions as to such means as might be deemed appropriate for correcting any of these forms of bad economy that might exist.

Responses were received from various portions of the country; and while the evidence was generally to the effect that there did exist a considerable tendency among people of moderate means to bad economy, there were several noteworthy opinions to the contrary.

Mr. P. H. Felker, editor of the *St. Louis Grocer*, stated that he has had an experience in the retail grocery trade, and does not think that people of moderate means exhibit bad economy, as a rule, in the purchase of expensive kinds of food. Nor does he believe that much is thrown away by poor people. His experience is, that those who pay for what they buy do not waste, but that those who do not intend to pay, but expect the world to give them a living, are careless and wasteful.

Charles N. Chapin of Providence, R.I., is another of the dissenters. He believes that there can be little question that there is a tendency to purchase needlessly expensive qualities of all kinds of food, but he is certain that there is not nearly as much extravagance absolutely among such persons as there is among the rich or even well-to-do, and he doubts very much whether there is relatively as much. According to his experience, day-laborers, workers in mills and factories, and the poorer class of mechanics, do not as a rule purchase as fine a quality of meat and groceries as do those in better circumstances. There is a large grocery in his city whose patrons are chiefly well-to-do or rich, and this grocery has never taken out an 'oleo' license; while in the stores in the poorer parts of the same city, and in the manufacturing villages, oleo is sold in large quantities, sometimes almost to the exclusion of butter. The dealer in choice groceries informs him that he sells five barrels of Haxall flour to one of St. Louis, while in the mill villages the proportion is two to one in favor of St. Louis. A butcher having some of the best trade in Providence, and also having a

store in a neighboring manufacturing village, states that he sold cheaper and leaner meat in the village than in the city, yet this same man says that some of his most extravagant customers in the city were among the poor. As at this point Mr. Chapin makes an important suggestion, we quote his words: "And just here, it seems to me, is the place where an error has crept into Professor Atwater's article, and also into the report of the Massachusetts Labor Bureau. In the case above mentioned the majority of the persons who bought at the city store were rich, and those who were not were chiefly coachmen, washerwomen, janitors, and persons who were objects of charity; in other words, those who were brought into comparatively close contact with the rich, and who hence aped their manners and tastes. Such people are often the most extravagant in the world. I think it will be found that it is chiefly in neighborhoods or in stores where the rich and poor purchase together that an inordinate extravagance will be found on the part of the poor. I am positive that in our manufacturing villages and in the manufacturing sections of this city, the working-people, while requiring good food, do not consume such a high grade of goods as do those in better circumstances." In regard to the actual waste, — non-consumption of foods purchased, — Mr. Chapin holds that all evidence goes to show that the poor are much more economical than the well-to-do or the rich. In Providence the swill-contractor gets the same amount of swill from less than six thousand persons in the wealthy part of the city as he does from over twelve thousand persons in a manufacturing district; and the swill in the former case contains a large amount of nutritive material, while in the latter case it consists chiefly of bones, codfish-skins, parings from boiled potatoes, etc. Mr. Chapin believes that the use of novel or artificial articles of food, such as canned goods, oleo, glucose, cottonseed-oil, baking-powders, etc., tends to make living cheaper, while these foods are in many cases just as palatable as the more expensive. Mr. Chapin finally suggests that it is, after all, a question whether any but a very few, the very poor, need to practise much greater economy than they do. While it is true that the neck is as nutritious as a sirloin steak, it is equally true that the latter is more palatable. A man would be comfortable in patched clothes and a room with whitewashed walls and a bare floor, yet we do not consider it a sin or even unwise for the majority of even wage-earners to make their surroundings agreeable.

Mr. David Murray of the University of the State of New York has serious doubts whether the prejudice which Professor Atwater speaks of, against the purchase of cheap food, exists to any very considerable extent.

We have also to class among the doubters of the waste of food Mrs. M. Fay Peirce, New York, author of 'Co-operative House-keeping.'

Mrs. Fay's experience is, "that Americans, especially men, crave meat three times a day; and if they can get it, they have it. No doubt," she says, "they could do with meat once a day, and make up in milk and eggs. The fact remains the same, that the human system prefers a great deal of meat; and may not the enormous energy and enterprise of the American people, and the large average of mental work which as a nation Americans accomplish, be in great measure due to the national indulgence in meat? In answer to the first question, I should therefore hesitate to say that too much meat is purchased by our people. Second, Roast meat and broiled meat are, of course, infinitely more enjoyable than boiled and stewed meats. No matter how exquisitely flavored the *ragouts*, the appetite will tire of them; but of beefsteak and mutton-chops broiled, or of roast beef and roast mutton, etc., people never tire. You cannot, however, roast or broil cheap and tough meat: hence Americans buy the roasting and broiling pieces. If they liked a savory stew as well, of course they would save their money and buy it. The simple fact is, that no art of the cook can equal the flavors of nature. Roast and broiled meat is meat *au naturel*, and, as long as the poor man can pay for it, he may be expected to indulge in it. Moreover, no doubt such meat is far more exhilarating and nourishing than boiled and stewed meats. Third, I do not believe that poor people throw away any thing they can eat. I believe that every thing they buy is eaten except the bones and the potato and squash parings; and, in general, the women who do their own

cooking probably waste little if any thing. It is with the servant-keeping class that waste begins. Every servant throws away that which her mistress would save were she doing her own cooking; and the higher up in the social scale we go, the more expensive and varied the table, the more frightful is the waste. Of course, nothing can stop this but the constant supervision of the house-mistress in precisely the way that the careful German *haus-frau*, and the French middle-class woman or *bourgeoise*, keep a dragon watch over their respective cooks; and it is to be doubted whether this will ever be the case with us while American men make money so easily, and are so generous with it as hitherto. It is, of course, a perpetual slavery to the house-mistress — a tying-down to three meal-times a day — when the servant must be superintended and watched; for this must go on not only while she is preparing the food, but also while she is clearing the remnants of it away. Fourth, I have given what I consider the one and only solution, and a perfectly comprehensive one, of all the waste of contemporary housekeeping, as well as of its innumerable imperfections and shortcomings, in the theory of 'Co-operative Housekeeping.' If housekeepers never combine to keep house, i.e., to make homes in the best and cheapest manner possible, house-keeping and home-making never will and never can become to every member of the civilized human family what it can and ought to be. Meantime perhaps the best thing that could be done for the poor would be to insist on every girl of twelve or fourteen years of age who leaves the grammar-schools, learning how to make a savory stew out of cheap meat, and also how to make thick soups (what the French call *purée*) out of dried pease and beans, and also out of potatoes, onions, celery, spinach, etc. I know that poor women constantly wash and sew for a living, and bring up their children on tea and bread chiefly. Of course these are cheaper at the moment, and easier, than even a cheap meat-stew; for cheap tea is certainly a very cheap way of getting motive power to work, probably the cheapest there is. But if poor women knew how to make a cheap stew that is really appetizing and satisfying, perhaps they would more often do it."

Prof. J. B. Clark of Northampton, Mass., agrees that the poor, in common with other classes, depart from the rule of a maximum of nutriment for a given sum; but the departure is, in his opinion, rather beneficial than otherwise. If any class in America above the very lowest were to consume as much food as they now do, and were to select the kinds that offer the largest amount of nutriment for the money, they would suffer from the worst physiological effects of over-eating. There is, however, a general habit of consuming too much sugar for either health or economy, and of using unnecessarily expensive grades of flour and meat.

Prof. Edward W. Bemis of Vanderbilt University, Nashville, Tenn., agrees with Professor Atwater as to the great wastefulness almost everywhere prevalent in this country, but to the list of reasons assigned by him, would add another as also operative in considerable measure in the case of the average wage-earner. As he writes, "it is generally believed by the latter that wages tend to fall toward the customary cost of living, to that point which will sustain a given class of workers in their usual comforts; and that, in consequence of this, any denial of one's taste which is involved in the use of the cheaper and more nutritious, but even, according to Professor Atwater, less palatable foods, will only result in the end, if generally adopted, in lower wages. To establish this dependence of wages on average expenditures is the sole aim of George Gunton's recent book, 'Wealth and Progress.' At one time the reasoning on which the above book and the general belief of our workingmen are founded seemed conclusive to the writer, and the presentation of the argument, as it then appeared to me, drew out, in private conversation with a prominent writer and advocate of Professor Atwater's views, the candid admission that 'perhaps, after all, the great benefit of this more scientific choice and preparation of food will consist in prevention of dyspepsia,' — one of the few ailments from which the poor are comparatively free. He was right, provided the theory of wages just quoted — which, be it noted, is quite a modification of the so-called 'iron law' — is correct. This I do not believe; that is, it seems to be true only with this important change, — that wages tend to fall to that point which will maintain the workman in his usual comfort, and permit

of his usual savings; the latter, it is true, being now small or non-existent, and both the standard of comfort and savings being subject to fall in times of long-continued industrial depression or cut-throat competition from the unemployed or from immigrants used to a lower standard of living, but also (and this is most important) being subjected to great and general increase with education and enlargement of social wants. Money saved by the use of cheaper and equally nutritious food may be invested in banks and co-operative building and loan associations, called in Massachusetts 'co-operative banks,' and wages be still maintained at the old rates: for the money saved will become the capital of its borrowers, and thus increase competition for labor. This is no place for a full discussion of the subject, though one's theory of wages is the perhaps unconscious basis of nearly all discussion of economy of food as applied to the elevation of the masses, in which aspect Professor Atwater's ideas attain their widest importance. If wages may be kept as much above one's standard of living, after allowing for the rewards of the capitalist and employer, as the general thrift, intelligence, and power of combination of the workmen may secure, and not necessarily fall with the use of less expensive and equally nutritious diet (as most wage-earners, both in and out of the unions, believe), then the present widespread and natural objection of the masses to the views of Professor Atwater will be fully met." Professor Bemis therefore urges, first, a far deeper study of the theories of wages, and a far wider dissemination of correct views on the subject among the masses, as a necessary preliminary to instruction upon the direct question of food-supply.

The opinion of the majority of the replies is well given by Mr. F. E. Manson of the *Kennebec Journal*, Augusta, Me., who writes, "I have observed, even among the employees of our own establishment, the tendency to bad economy, especially in early spring, when food-articles first coming upon the market are sold at outrageous prices. Again: the purchases made the year through at the provision-stores show the tendency toward luxury instead of healthful and strength-giving food. There is no doubt in my mind that there is a vast diminution of the real fuel-properties of food in the way it is cooked by the very people who most need its every strength-giving property. One has simply to sit down at a table to evidence this. There is here a cause of the very condition ('of moderate means') of our people. To make the most of food-articles is yet a lesson to be learned. Generally among our people an article of food once cooked is considered done. The parts not eaten are wasted; whereas if the parts had been separated before cooking, and cooked in different ways, or separated after cooking and re-served in a different form, all the nutritious properties would have been consumed, and economy practised."

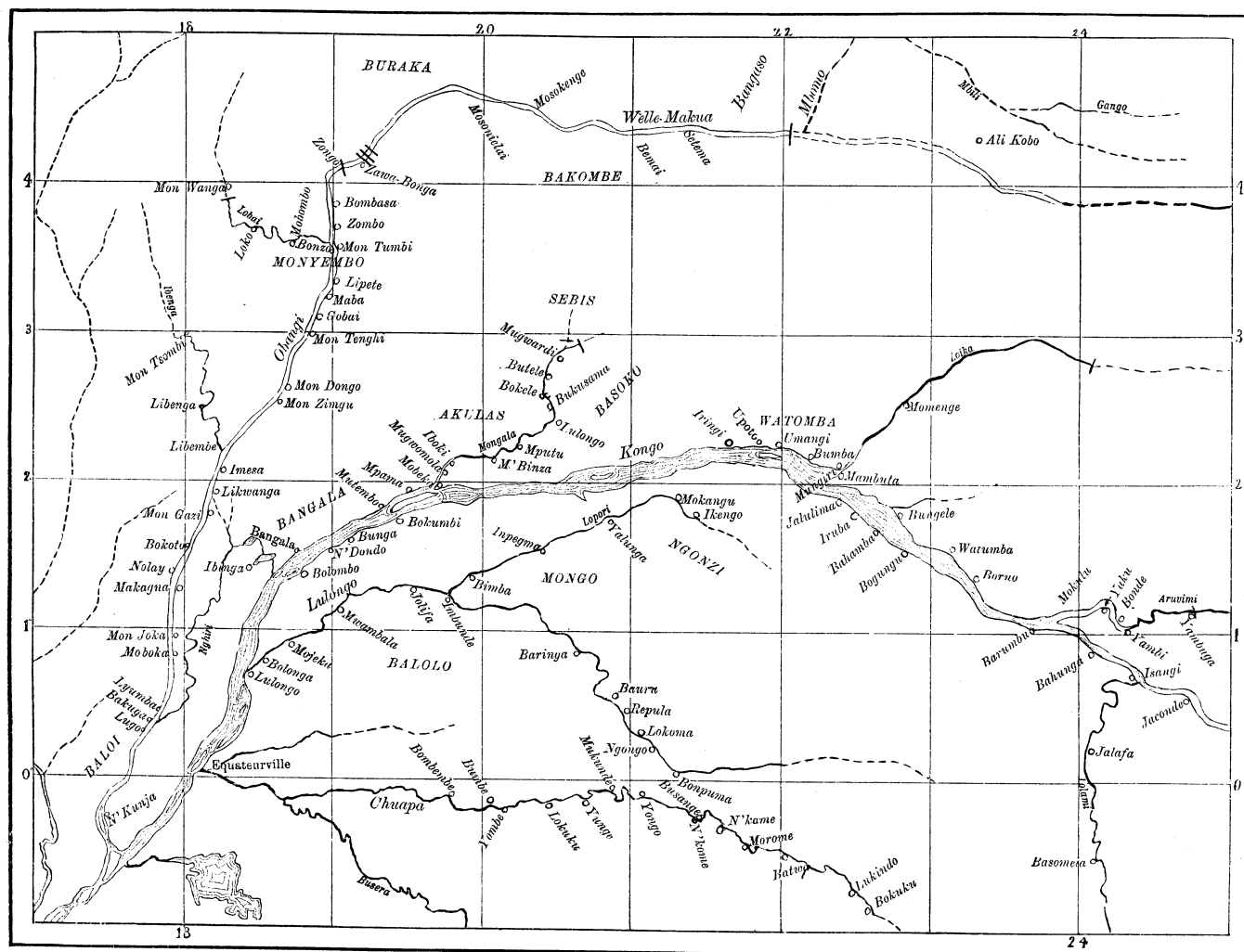
In reply to one inquiry, Gen. F. A. Walker of Boston writes, "Among people of moderate means in the United States there unquestionably is great waste, resulting alike from indifference and from ignorance; but among the very poor the waste is simply hideous. Cheated often in quantity, quality, and price at the retail stores, the great majority of the women of the poorest class, who are generally foreigners, are altogether incapable of managing what they get for their scanty incomes, with true economy. They lose in storing their supplies, in cooking them, in serving them. Even this is not so bad as the injury done to health and to personal habits (through the promotion of intemperance) by frying food, by the use of saleratus, and by the bad management of fires during the process of cooking. Much can be done by the intelligent and benevolent to promote a better economy of the small means of the very poor, through lectures, newspaper paragraphs, and house-visiting. But it is with the cooking-school that the hope of a better generation of housekeepers and domestic cooks chiefly lies. The economy of food and materials here secured is quite as remarkable as the superiority of results in wholesome, cleanly, appetizing food. On the former point let me cite a single instance. At the Tennyson Street School, in Boston, the amount of coal consumed during the first nine weeks of the present school-year, in keeping the range ready to cook, from half-past nine to four o'clock each day, five days in the week, was only one-quarter of a ton. No one can visit the school to which I have referred without being impressed by the truly and highly educational character of the teaching given, as well as by the immense practical value of what

is learned. And there is this notable difference between the 'book-learning' in the public schools and the instruction in cooking and sewing given in them; viz., that while the former does good to the children only, and leaves the parents where their own schooling (if any) left them, the domestic arts taught are at once carried home, and become a speedy and efficient means of improving, if not of transforming, the household. Believing, as I seriously do, that the chief cause of that destructive appetite for strong drink, which we once deemed native and ineradicable in the human constitution, is found in unsanitary conditions, especially in badly cooked and improperly prepared food, I look on the public cooking-school as, in a high sense, the hope of the Republic. I believe that a given effort and expenditure directed to this point will accomplish a hundred times more towards eradicating intemperance than

EXPLORATION OF THE OBANGI-WELLE.

THE incessant endeavors of the Kongo Free State to ascertain the supposed identity of the Obangi and Welle have at last been successful. The last issue of the *Mouvement Géographique* gives a sketch of the result of the last expedition, which was under the command of Captain van Gèle. The sketch-map below shows the results of this exploration.

On Oct. 26, 1887, the expedition started from Equateurville on board the steamer 'En Avant,' which had a large canoe from Stanley Falls, capable of holding a hundred men, in tow. The party consisted of Captain van Gèle, Lieutenant Liénart, the captain of the steamer, a carpenter, seventeen soldiers, and twenty-four natives. On Nov. 21 the rapids of Zongo were reached, which stopped Grenfell's progress on his reconnaissance in 1884, and Van



THE UPPER KONGO AND THE BASIN OF THE OBANGI-WELLE, SHOWING THE DISCOVERIES OF CAPTAIN VAN GÈLE.

the same amount of effort and expenditure directed against the drinking-habit, when once formed."

Prof. William H. Brewer of New Haven answers in the affirmative to each and all of the queries. He believes there is waste, "partly through ignorance, partly because of prejudices against particular kinds of food, partly because of mistaken social notions, and divers other causes. Cooking is an art, and careless cooking causes much waste directly, and indirectly prevents much being made available that is now about wasted." As a member of the Board of Health, Professor Brewer has looked into the matter of kitchen garbage in several cities, and so has means of knowing that people of moderate means do throw away a great deal of nutritious material instead of consuming it economically. He thinks such bad economy can only be bettered by education and the diffusion of knowledge, especially of those kinds of sciences which are more immediately pertinent.

Gèle in 1886. Here a succession of rapids was met with, which it took twenty days to pass. The steamer was unable to pass the first rapids, although it was at the season of high water. The machinery had to be taken out, and was carried over a portage. The steamer was then drawn by a tow rope up the rapids, and was remounted. For eighteen miles her progress was not hindered by any obstacles, but then the rapids of Bonga were reached. These consist of a reef, crossing the whole width of the river, and leaving only a narrow channel near the southern bank, through which the steamer passed without any difficulty. After a short while a new rapid was reached. Here the Obangi narrows to a width of fifteen hundred feet, while it attains a depth of fifty feet. These narrows were hardly passed, when the river was found to expand to sixty-five hundred feet in width. It is studded with rocky islands, between which the waters rushed towards the narrows, boiling and foaming. The steamer was unloaded, and the cargo carried over a portage.

Thus she was enabled to ascend the rapids. Three miles farther up the river another rapid similar to the last was found, and ascended in the same way. The next obstacle was by far the most formidable one. Several islands situated in the river are connected with the banks by rocks, over which the river falls. Here the 'En Avant' had to be unmounted and unloaded, and the hull was hauled up the fall with great difficulty. Captain van Gèle describes this region as follows:—

"The country is beautiful. The banks of the river are bordered by hills of gentle slope, with woods and prairies, plantations of bananas, and fields of maize. Most of the villages are situated on the slopes of the hills. Seen from afar, the huts give the impression of Swiss cottages. If there were herds of cattle grazing on the prairies, the illusion would be complete. The country seems to be of great fertility, the grass attaining in some places a height of twenty feet.

"The fronts of the villages situated on the banks of the river are fortified by stockades. On high trees of cottonwood, guards are stationed in rudely constructed huts, which have given rise to the legend of aerial villages. I have not seen any manioc or palms in this district, while bananas, sugar-cane, and maize abound. Up to the third rapid the natives are of the same type as those living farther south on the river. Their heads are shaved, and their heavy mustaches give them a military air. Their faces are not tattooed. We were very kindly received by this people. Above the third rapid a new tribe was met with,—the Bakombe, who are said to occupy a great part of the territory between the Obangi and Kongo. They have a very remarkable fashion of dressing their hair. Some wear enormous chignons; others, forms similar to those worn by the Mombutu; still others, long and slender tresses, sometimes as long as six feet."

At the last rapid the waters of the river come from the northeast. The view is grand. The river is about twenty-eight hundred feet wide, and free from obstacles. Farther east its course was found to be westerly. No tributaries were discovered above the rapids. On the northern bank the country is level, while in the south a few low hills may be seen. Although not a single house is seen from the steamer, the country is densely inhabited, numerous villages being situated a few hundred steps distant from the banks of the river. The latter are called 'Dua' by the natives. There are numerous islands, most of which are inhabited and cultivated. Captain van Gèle states that the country is one of great fertility, and that more provisions were offered him than his party was able to consume. Beautiful work in iron is made by the natives, while ivory seems to be little valued. It is worth remarking, however, that it is used for labrets worn in the upper lips.

At Bemay a new rapid was met, which, however, was passed by the help of the natives. A few miles above Setema, the first tributary, the Bangaso, was seen. It is a remarkable fact that neither on the north nor on the south side are there any tributaries. The same scarceness of tributaries is observed on the Kongo: therefore it seems probable that the region between the Shari and the Chuapa is throughout occupied by rivers running east and west. After the Bangaso was passed, a new tribe was met, the Yakoma, who attacked the steamer. On Jan. 1, 1888, the 'En Avant,' which steamed along the north bank of the river, met a line of rocks forming a rapid. The steamer separated from the canoe in order to search for a pass. Immediately numerous natives attacked the canoe. At the same time the steamer struck a rock, and it was necessary to unload and to make a landing among the hostile natives. Lieutenant Liénart, who was charged with this task, was kindly received, but only to be attacked the more vigorously later on. In the ensuing struggle two of his men were killed. After all, the steamer was reloaded and repaired on an island; but the hostility of the natives, and the fact that the water of the river was falling rapidly, made it necessary to return at once. The expedition had reached $21^{\circ} 55'$ of longitude, the distance to the farthest point of Junker being some seventy miles. It is in this unknown stretch that the Mbomo empties itself. The return was effected without casualties.

The important result of this expedition is to show that the Welle belongs to the Kongo system; for it would be unreasonable to doubt its identity with the Obangi any longer. There is also some prospect of having the western boundary of the Kongo basin explored ere long. Two German expeditions are pushing eastward from

Kamerouns, while the English missionary Brooke is ascending the Obangi, intending to strike north-westward from Zongo.

SCIENTIFIC NEWS IN WASHINGTON.

The Work of the United States Fish Commission on the Atlantic Coast; the Migrations of Fishes governed by the Temperature of the Water; Isothermals to be constructed.—A Great Work by the Bureau of Ethnology; the Dictionary of North American Indian Tribes completed.—Shall the Arid Lands be reclaimed? a Magnificent Undertaking.—A New Law for the United States Fish Commission proposed.

The Work of the 'Grampus.'

ONE important fact has been established by the investigations of the United States Fish Commission, and that is, that the movements of the great masses of food-fishes that visit the bays and rivers of this country in summer are not governed by a desire to return to the localities where they were born, nor by the scarcity or abundance of food, but by the temperature of the water in which it is suitable for them to spawn. For instance: the shad never enter one of our bays or rivers in the spring until its temperature has become 60° F. Then they pass into the rivers, and up towards their sources, always seeking the warmer waters. They move up stream when the difference of temperature is so slight that it can only be detected by the use of a differential thermometer; but so sensitive are they with their whole bodies immersed, that they easily discover the direction in which the warmer water lies.

The reason why the attempt to plant shad on the Pacific coast failed is now known. Large quantities of little shad were planted by the United States Fish Commission in the Sacramento River. Very few of them returned, and all the attempts to stock the Pacific coast waters with shad have resulted only in distributing the fish in small numbers along the coast to Vancouver's Island, a distance of sixteen hundred miles. A few now enter the small rivers that have their sources near the coast, but nowhere do they show a disposition to come in great bodies, as on the Atlantic coast. The explanation is, that the bay is fed by rivers rising in the mountains, and bringing down melted-snow water, so that its temperature during the spawning-season for shad is only 55° or 60° . Fishes that were placed in the Sacramento River one year, therefore, never come back. If they approach the bay, they find it too cold to pass.

California salmon, on the other hand, require a temperature of from 40° to 45° for spawning. As they go up the rivers from the Pacific Ocean, the water becomes colder, and they finally reach that which is just right. But young California salmon placed in Eastern rivers do not become acclimated; in fact, they rarely come back. Of fifteen million young ones so planted by the United States Fish Commission, not more than three or four have ever been caught or seen in the rivers it was desired to stock. The water of the rivers is warmer as they go up stream, and they avoid it. The attempt to stock the rivers of southern Europe flowing into the Mediterranean Sea with California salmon has been successful for two reasons: they have not been able to get out of the Mediterranean and find other spawning-places if they desired; and they have found streams which, being fed by melting snows in the mountains, furnish the conditions sought.

Menhaden never enter rivers the temperature of which is below 50° . These fishes visited the coast of Maine in great numbers for forty years, but in 1878 suddenly disappeared. The same year the mackerel did not enter the Bay of Fundy. It is now believed that this strange phenomenon was caused by a change in the temperature of the water.

These facts being established, it becomes very important, from an economic point of view, to ascertain what changes take place during the season in the temperature of the ocean off our coast and of the bays enclosed by it, to plot isothermals, and to lay down upon charts the migrations of these isothermals as the season advances. It is believed, that, when this is done, the migrations of our summer food-fishes will also be discovered, and that their movements can be accurately predicted. This work has been assigned to the 'Grampus' for the present season. Her field will be from the capes of Virginia north. She will make careful obser-

variations of the temperature of the surface and bottom of the water, and try to plot the isothermals of 50°, 55°, 60°, 65°, and 70°. The reports of a vast number of former observations made with other ends in view, but which included temperatures, are now being examined in Washington, and the results plotted upon charts; so that the amount of data available for constructing the isothermals will, by the end of the season, be very large.

Another duty assigned to the party in the 'Grampus' is to discover, if possible, the spawning-grounds of the bluefish and mackerel. To this end the great masses of floating fish-eggs found upon the ocean at certain seasons will be examined for the purpose of determining what they are. Small hatching-apparatus have been supplied; and samples of the eggs will be hatched, and the young developed sufficiently to enable the embryologists to determine what they are. This work, if it is successful, is also expected to be of great economic value. In order for Congress to be able to legislate intelligently for the protection of food-fishes, it is necessary that their habits should be understood. If the mackerel and bluefish, for instance, spawn out at sea, where there is no danger that they will be disturbed by fishermen, it will be unnecessary to make laws restricting the capture of them on the grounds where they are usually taken. It is not probable that the capture of these fish for food or other purposes makes any perceptible difference in their numbers, unless they are stopped on the way to their spawning-grounds.

Dictionary of North American Indian Tribes.

The Bureau of Ethnology has substantially completed the dictionary of North American Indian tribes, upon the preparation of which it has been engaged for many years; and it is probable that the work, comprising a volume of about five hundred pages, will be published within a year. For practical as well as scientific uses, this will be the most important product of the bureau since its organization; except, perhaps, the map showing the geographical distribution of the linguistic families of Indians, a notice of which was recently given in *Science*. The material is now in the form of cards alphabetically arranged. Each card contains one title, and of these there are between forty thousand and fifty thousand.

The plan of the work is to give alphabetically the name of each linguistic family, tribe, and village of the North American Indians at the time of the settlement by Europeans, with all the known synonymes for them. The work has involved the long and patient labor of a great number of specialists under the direction of Prof. H. N. Henshaw, and could not possibly have been undertaken by a private individual.

A word as to the method of preparation. The literature of the North American Indians is very voluminous. Early and later explorers, travellers, missionaries, traders, pioneer settlers, and soldiers have written about them, or have referred to them in their books. Very rarely have they been careful to be exact in the spelling of the names of the tribes they have described; and, when they have done so, typographic errors have crept in, which have been perpetuated and often added to by other writers, until the synonymes have been multiplied almost without end. For example: the number of different names and different spellings of the same name found in literature to designate the Mohawk tribe is about two hundred. The most of these would not be recognized by the ordinary reader, and many of them not even by the student of Indian ethnology. In fact, even the scientific man can hardly read five pages of an old book on the North American Indians without encountering the name of an Indian tribe that he never heard of.

Many writers have misunderstood the names the Indians gave them; others, thinking from the form of the name as they have found it in some book that it must be incorrect, have guessed at what it ought to be, and have generally corrupted it still more; still further variations have been caused by typographic errors, as has already been noted, until there was almost inextricable confusion. For instance: one writer speaks of the 'Roundaxes' Indians; an earlier one, of the 'Rondaxes'; one still earlier, of the 'Orondacks'; and the true name is the 'Adirondacks.' In another case the 'Round Head' Indians are mentioned; a French book, which was probably this author's authority, calls the same tribe

the 'Tête de Boule'; he probably got the name from an English writer who had spoken of them as 'Bullet Heads'; their true names was 'Bull Heads.' In still another instance the reader encounters the name 'Pickpocket' to designate a tribe. This came from 'Pickwocket,' which was itself a corruption of 'Pigwolket,' which somebody wrote for 'Pigwacket.' The last writer misunderstood the true name 'Pâgwâki.' The following is very funny: The 'Kouani' tribe are first called 'Kuhus,' then 'Ku-un,' then 'Kun' (pronounced 'Coon'), and then 'Raccoon.' The 'Sundowns' of a certain author are the 'Samdams.'

By a careful examination of the literature of the North American Indians, all these names have been collected and arranged, first under the linguistic families, and then according to tribes. When thus brought together, the origin and relations of the different synonymes have been discovered, although previously they were not at all apparent.

In the dictionary the name of each linguistic family will be given in its proper alphabetical place, followed by a short history of each, a description of it and of the country it inhabited, and a list of the tribes that composed it, and of the villages in which they lived. The name of each tribe will be found in its proper place, with a list of all the synonymes for it; each of which, in turn, will be entered in alphabetical order with a cross-reference to the correct name of the tribe, a statement of the linguistic family to which it belongs, and a list of the villages it occupied. Finally, the name of each village will be entered, followed by a brief description and a statement of the tribe and linguistic family of its people, and the number of its inhabitants.

The publication of this dictionary will make intelligible much in the literature of the North American Indians that has heretofore been vague and confused; it will enable the reader of books referring to them to identify the tribes and villages; it will simplify the labors of investigators in all other branches of Indian ethnological research. For example: a great number of skulls have been collected at the National Museum, where they are classified and arranged for study. The collectors are many of them army officers, Indian agents, and voluntary contributors, not special students of ethnology, who have given the names of the tribes represented as they have heard or understood them. The dictionary will enable the curators to identify these tribes, and thus make the classification easy. Dr. Yarrow of the Army Medical Museum is preparing a book on the mortuary customs of the Indians. Until this dictionary is published, or he has access to it in its present form, no thorough classification can be made. The dictionary will also enable the government to determine the boundaries of lands ceded by Indian tribes, and in many other ways clear up doubtful and disputed questions.

Reclamation of Arid Lands.

Congress has been asked for an appropriation of two hundred and fifty thousand dollars to pay for the preliminary work of damming up the cañons of the Rocky Mountains, from the Dominion line to Mexico, and thus forming vast reservoirs of water to be used in the irrigation of arid lands, and preventing the disastrous floods on the lower Mississippi. The area of arid land in the United States is about 1,300,000 square miles; and Major Powell, director of the National Survey, estimates that at least 150,000 square miles of this might be reclaimed, — a territory exceeding in extent one-half of all the land now cultivated in the United States. The plan is to build dams across all the cañons in the mountains, large enough and strong enough to hold back the floods from heavy rains and melting snows, and then to let the water down, as it may be needed, upon the lands that would be reclaimed.

The preliminary work for which the appropriation is asked is to pay for surveys to determine the sites and locations for the dams, reservoirs, canals, and irrigation areas; the total volume of water susceptible of storage, and the loss through evaporation and seepage in the reservoirs and canals; the area of land to be served by a unit of water; the value of the redeemed land for the growth of the crops adapted to the climate and soil; the expense of constructing the dams and canals and the expense of maintaining them; what vested rights, if any, exist.

With ample appropriations, at least two years will be required

for this preliminary work: Major Powell, who has probably studied the Rocky Mountain and arid region more carefully than any one else, declares that the scheme is a perfectly feasible one, and that the cost, though very great, will be but a small fraction of the value of the land reclaimed. While the western portion of the United States is not yet crowded when compared with Europe, or even with other parts of our own country, it is no longer true that "Uncle Sam is rich enough to give us all a farm." But, if 150,000 square miles of the arid lands of the United States could be reclaimed, the limits of our agricultural development would be enormously extended.

Re-organization of the United States Fish Commission.

The bill prepared by Professor McDonald, and introduced in the House of Representatives, to re-organize the United States Fish Commission and to define its duties, declares "that it shall be the duty of the commissioner of fish and fisheries to continue the systematic investigation of waters of the United States, and of the biological and physical problems they present, with the object of determining the character, abundance, geographical distribution, and economic value of the inhabitants of the waters, both salt and fresh, as also their migrations, and the cause influencing or regulating the same. This investigation is to be conducted on a broad and comprehensive plan, so as to arrive at the life-history of all species having economic value, as well as those species to which they are intimately and essentially related.

"That he will continue the investigation into the history of the methods and apparatus of the fisheries and for the preservation and utilization of fishery products now in use, and will cause careful study to be made of new methods and apparatus introduced from time to time with the object of determining their effect upon production, and furnishing the information upon which to frame intelligent legislation regulating the conduct of the fisheries and improving their methods and apparatus.

"That it shall be the duty of the commissioner of fish and fisheries to provide for the collection of the statistics of the fisheries of the United States, especial reference being had to the fisheries of the Great Lakes and of the New England and North Pacific coasts of the United States, which are of international importance, and may influence or become the subject of treaty stipulations. The statistical inquiry hereby authorized and directed shall be comprehensively planned to accomplish the purposes for which it is instituted.

"That it shall be the duty of the commissioner of fish and fisheries to continue the work of artificial propagation of food-fishes and other useful inhabitants of the water with a view to their introduction into and establishment in the interior and coast waters, and to the maintenance and improvement of the important commercial fisheries of the coast and interior lakes and rivers. To this end he will, in his annual estimates transmitted to Congress, provide for the maintenance and operation of the existing stations of the commission, and for the maintenance and operation of such additional permanent and field stations as may be from time to time authorized and directed.

"That the commissioner of fish and fisheries shall appoint such employees as Congress may from time to time provide, with salaries corresponding to those of similar officers in other departments of the government, and he shall, as Congress may from time to time provide, employ other persons, of expert knowledge, for such time as their services may be needed, including chemists, naturalists, and physicists, for the conduct of the researches and investigations required in the performance of the duties devolved upon this department, or which may be from time to time authorized and directed by Congress."

HEALTH MATTERS.

CONTAGION IN COURTS. — The State analyst of New Jersey, in a recent trial, when called upon to take an oath as witness, avoided kissing the Bible on the ground that he might contract disease by so doing, saying, "So many different persons have kissed that book, that I do not think it safe to touch my lips to it." The court held that the witness must kiss the book, and he reluctantly did so. This seems like a trifling matter, and yet it might be a serious one.

The danger of contracting disease in this way is not imaginary. Until courts so disinfect the Bible on which oaths are taken as to make the act of kissing it safe, we would advise the practising of a device which the writer has for years employed; viz., to kiss the fingers with which he holds the book.

EDUCATING THE WHITE BLOOD-CORPUSCLES. — Dr. Ray Lankester, in an address on 'The Struggle for Life' (*The Hospital Gazette*), in speaking of the function of the blood-corpuscles, said that the corpuscles could be educated to deal with the bacteria, and the future of preventive medicine would be the education of the white blood-corpuscles. The fact that one man, by constant use, could without injury take a dose of arsenic that would kill six ordinary men, was due to the fact that he had by weakened doses been educating and training the white corpuscles. They could be taught to eat and flourish under conditions which, if not commenced gradually, would be destructive to them, and that was the principle underlying protective inoculation. As a preventive of many fatal diseases in sheep and oxen, inoculation had been remarkably successful. The corpuscles first received a weakened breed of disease by inoculation, and thus when a violent attack came they were ready to receive and dispose of it. This education of the corpuscles, it seemed to him, was the explanation of the success of vaccination. They received a weak dose of the poison from the vaccine, and were in that way prepared for a stronger dose in the way of small-pox. He believed the white corpuscles could be trained to receive the most virulent poisons, and he hoped this training would be carried on so as to deal with a great number of diseases.

ELECTRICAL SCIENCE.

Sir William Thomson's Electrical Measuring-Instruments.

FOR some years past Sir William Thomson has been working on electrical measuring-instruments with a view to perfecting some means of accurately and easily measuring the heavy currents and the potentials used in commercial work. Mr. J. A. Fleming, in *Industries*, describes the latest forms Sir William has produced. The ammeters are six in number. The different types are, —

The Centi-ampère balance from	1 to	50 centi-ampères
" Deci-ampère "	" 1 "	50 deci-ampères
" Ampère "	" $\frac{1}{2}$ "	25 ampères
" Dekka-ampère "	" 2 "	100 "
" Hekto-ampère "	" 10 "	500 "
" Kilo-ampère "	" 50 "	2,500 "

All of these instruments are on the same general plan. The attraction between two coils carrying the current — one movable, the other fixed — is balanced by a weight sliding on a scale-beam. Heretofore the difficulty in such an arrangement has been in getting heavy currents to the movable coil without greatly decreasing the sensitiveness of the apparatus. In these instruments there are two movable coils, fastened on the two ends of a light frame, and below each of them is a fixed coil. The frame has an axle in the middle by which it is suspended, and it is in the suspension that the chief novelty and improvement lie. The axle ends in two semi-cylindrical trunnions. Above them are two similar fixed trunnions. The two sets are connected by a number of extremely fine copper wires bearing on the rounded surfaces of the lower trunnions. This arrangement allows a free though limited movement of the frame, and the numerous fine wires will carry a heavy current. The winding of the two coils are such that one end of the frame is repelled, the other attracted, when a current passes. There is a scale-beam attached to the frame, and a weight moving on this is shifted until the frame is horizontal. The reading on the beam opposite the weight gives the current that is flowing. The great advantage of this arrangement, as in other forms of electro-dynamometer, lies in the fact that the readings are independent of any change in the strength of magnets, such as are used in ordinary commercial measuring-instruments, and also of the value of the earth's magnetism. The instruments, however, are not so portable as many other forms, and are somewhat difficult to adjust. They will be useful for standardizing the ordinary forms of voltmeter and ammeter.

ELONGATION AND CONTRACTION OF METALS IN MAGNETIC FIELDS.—The first experiments made by Joule on the effect of magnetization on the length of iron showed that the iron always elongated. Mr. Bidwell has investigated the effects of very much more intense magnetic forces than were used by Joule. At first the iron expanded, but, after reaching a magnetic force of about 90 C.G.S. units, the iron began to contract, reaching its original length at about 280 C.G.S. units, and contracting continuously until the force reached 800 C.G.S. units, the limit of the experiment. Cobalt, nickel, manganese, steel, and bismuth were also experimented on. The two latter were practically uninfluenced in length by the application of any magnetic force. Nickel and cobalt began to contract from the first: nickel continued to contract to the limit of the experiment; cobalt contracted until the value of the force was about 400 C.G.S. units, when it expanded again; not, however, reaching its original value at a force of 800 C.G.S. units.

A NEW ALTERNATING-CURRENT ELECTRO-MOTOR.—Patents have recently been issued to Nickola Tesla for an alternating-current transformer and a motor which embody some novel features. The motor is especially interesting: it is really a modification of a plan proposed by Prof. Elihu Thomson, although the arrangement is different. The armature consists of two coils wound at right angles to each other on an iron core. The coils are short-circuited on themselves, and are not in any way connected with the external circuit of the dynamo supplying the current. The field-magnet consists of an iron ring, the four quadrants being wound with coils, of which the two opposite are connected. The dynamo used to supply the currents has two sets of coils, giving alternating currents of exactly opposite phases. These currents are taken to the motor by separate circuits, and are connected to alternate quadrants of the field-magnet. The action of the motor consists in inducing, by the alternating currents in the field, currents in the closed circuit armature coils, and in alternately attracting and repelling the coils. This motor, then, has no commutator nor brushes, and, if it works, will be the simplest possible means of transforming energy. As to the efficiency and output of this motor, we will have more to say later.

HEATING EFFECT OF ELECTRIC CURRENTS.—M. Cailletet has experimented on the heating of wires by an electric current when the pressure of the air around the wire is increased. He finds that the heating effect is decreased as the pressure increases. A current that would fuse a wire under ordinary pressures, will only raise it to a dull redness when the pressure is increased. This shows the importance of convection in incandescent lamps, and the desirability of the highest attainable vacuum.

VARIATION OF CO-EFFICIENTS OF INDUCTION.—Mr. W. E. Sumpner has experimented on the co-efficients of self-induction of transformers under various conditions. He finds that the co-efficient varies greatly with different conditions of current, etc., and plots curves representing the values for different currents, defining the co-efficient as the rate at which magnetism changes with the current. The results of Mr. Sumpner's work show, perhaps, for the first time, the very great variation in a co-efficient that has been taken as constant in a large number of solutions of problems bearing on the subject of alternating currents. In this connection a series of papers on induction-coils, that is now being published in the *Electrical World*, is important. Heretofore the subject of alternating currents has not been experimented upon in a way to show whether the assumptions that have been made are approximately correct. These 'Experiments on Induction-Coils' show that many of the solutions that have been given are altogether wrong. So far, however, the most important papers of the series have not been published: their appearance is awaited with interest.

NEW METHOD OF READING REFLECTING-INSTRUMENTS.—The following is an abstract from a paper by M. F. Drouin, in the *Lumière Electrique*: "The usual mirror is replaced by a thin disk of glass. The scale being behind the instrument, the observer in front sees the scale directly through the glass; while he sees reflected from the front surface of the glass the image of an object, such as a black line on a white background, placed in front of the instrument and to one side. When the glass disk is deflected through an angle α , the virtual image of the mark is displaced

through a distance $d \cdot \tan 2\alpha$ (d =distance from glass to scale). The method can be used in a well-lighted room, and does away with all the trouble of lamps and shades."

BOOK-REVIEWS.

Tenth Annual Report of the Connecticut State Board of Health for the Year ending Nov. 1, 1887, with the Registration Report for 1886. New Haven, State.

IN addition to the usual official reports and tables of vital statistics, this volume contains a report on river-pollution by Prof. S. W. Williston, M.D., Ph.D., with reports on water-analyses by Prof. H. E. Smith, M.D., and William G. Daggett, M.D. This report is a very valuable and thorough one, and covers nearly one hundred pages. It is the outcome of an act of the Legislature authorizing the State board to investigate and ascertain, as far as practicable, all facts in relation to the pollution of streams and natural waters of the State by artificial causes, in order to determine the sanitary and economic effects of such pollution. In the report are described the chemical processes employed in the manufacture of brass, iron, paper, woollen, cotton, and silk goods, hats, and rubber goods, and the impurities which are cast into the streams of the State from these manufactories. In the analyses of the water, both the biological and chemical methods were employed.

The annual report also contains reports on an epidemic of dysentery in Thomaston, by R. S. Goodwin, M.D. In this report the author presents the following conclusions as a result of his study of the epidemic: "that the outbreak of dysentery at Thomaston, and at every other town on the Naugatuck River, occurred in consequence of the co-operation of several favorable influences. These were a certain season, a certain high temperature, a certain favorable location, unsanitary modes of living, and the use of impure drinking-water. Nevertheless, infection with a certain specific poison was the sole cause of this disease, and the rôle played by these influences in its etiology was only to increase the predisposition to the affection by rendering the human organism more sensitive to the action of this unknown poison."

Dr. C. W. S. Frost contributes a sanitary report of the city of Waterbury, from which it appears that small-pox, diphtheria, measles, and dysentery prevailed during the year.

Dr. F. E. Beckwith has contributed remarks on the recent outbreak of typhoid or enteric fever at Southampton, L.I. Just why this report is printed in the 'Annual Report of the Connecticut State Board of Health,' does not appear, unless the explanation is to be found in the following paragraph: "The sanitary suggestions which close the paper apply not only to Southampton, but to every small seaside resort in a developing state, where there are similar conditions of soil, surface of country, and water-supply." The remarks are instructive and to the point, and are worthy a place in the report.

Eleventh Annual Report of the Board of Health of the State of New Jersey, and Report of the Bureau of Vital Statistics, 1887. Trenton, State.

In this report are the following papers: 'The Legal Aspect of the Pollution of Streams,' by E. S. Atwater; 'Air, Water, and Food,' by Ezra M. Hunt, M.D.; 'Outlines of Representative Sewer Systems,' by J. J. Croes, C.E., F. S. Odell, C.E., George P. Olcott, C.E., C. P. Bassett, C.E., and Charles McMillan, C.E.; 'Exposure and Diseases of Operatives,' by D. Warman, M.D.; 'Typhoid-Fever at Mount Holly,' by E. M. Hunt, M.D.; abstracts from papers and discussions of the New Jersey Sanitary Association; 'Report on the Water-Supply from the Passaic Watershed,' by Prof. A. R. Leeds, Ph.D.; and reports from the health-inspectors. The board's report also contains a list of persons practising medicine in the State.

In his paper on air, water, and food, Dr. Hunt discusses the influence of impure air on the death-rate, and refers to the investigations of this subject by Messrs. Carnelly and Haldane of University College, Dundee; and also those of Dr. Anderson, the health-officer of that city. Several experiments showed that the average of carbonic acid and organic matter was uniformly higher in town than in suburban or country air, and that in open places the carbonic acid

during the night was less than during the day, as also the organic matter. Micro-organisms were less at night than in the day. In examining the air of the rooms of houses, it was found that carbonic acid, organic matter, and micro-organisms diminished in quantity as the cubic space per person increased from one hundred to one thousand cubic feet. The death-rate from phthisis was highest in three-roomed houses, which is accounted for by the fact that pulmonary consumption is seldom in the form of tubercular disease in young life; and in one and two roomed houses much fewer live to the consumption age, so as to diminish the material, and so make the actual death-rate lower. In reference to the purification of air independent of mechanical methods, the following recommendations are made: cleanliness of person and dwelling, and open-air spaces; frequent change of the air of the room; windows should be made to open above and below, and both sashes should be used as much as possible; the practice of having a lamp burning all night in bedrooms in small houses is greatly to be deprecated, as the heat, the organic matter, and the carbonic acid aid in the reduction and deterioration of the air. Dr. Hunt discusses schoolroom ventilation, and gives a large number of results of tests of the air in the schools of Hoboken. In speaking of water-analysis, he refers to the biological tests, and says that it would be premature as yet to claim any very determinate results, although much has been found that is valuable for comparison with chemical analyses. Dr. Hunt does not think it to be an important function of a health board to deal with the question of adulterated mustard or spices, nor with the sale of oleomargarine, inasmuch as it has never been shown that there is any serious risk to health in their use. He appreciates the desirability of preventing commercial frauds, but does not regard this as a function of health laws.

In the paper on sewer systems, descriptions are given of the drainage and sewerage of the Lawrenceville School, Mercer County, N.J., and of the systems of Long Branch, East Orange, and Morris Plains.

The article on exposures and diseases of operatives is in the line of valuable work which the State board has been pursuing for some time; namely, an inquiry into the condition of workshops and factories, and as to the influence of the various trades and occupations upon the lives and health of operatives. The chief report this year is upon the pottery industry. Dr. Warman gives the results of his investigation of this industry in the following recapitulation: (1) that dust, and the liability to inhale it, is the principal cause of potters' asthma and potters' consumption; that the greatest number of sufferers from the above-named diseases occurs among 'china scourers'; (2) the greatest sufferers from lead-poisoning are dippers, and those assisting them, — glost-placers, mixers of colors, ground-layers, majolica and other painters, and those who 'fettle' ware after it is dipped; (3) that the pottery workmen most liable to rheumatic affections are ovenmen and kilnmen, who are greatly exposed to heat and strong draughts; they also suffer much from colds contracted from the sudden checking of the perspiration, which often terminates in acute inflammations of the chest; (4) that those engaged in sedentary occupations suffer most from disorders of the digestive organs, liver, and stomach, followed by general debility, defective blood-making, and hence bloodlessness, sensitiveness to cold, constipation, and a tendency to internal congestions; (5) the auxiliary causes are neglect of cleanliness, in work, in shops, in dress and in personal habits, inattention to ventilation and to the heat and moisture of the workshop, intemperance, and irregular living; that a large majority of workers do not remain continuously at the work for more than from fifteen to twenty years; finally, that the removal of the exciting cause or causes is the only rational means of preventing or interrupting the diseases of potters. Statistics show that pottery operatives in this country are in better health than those in the Old World.

Evolution and its Relation to Religious Thought. By JOSEPH LECONTE. New York, Appleton. 12°. \$1.50.

It is always with a deep sentiment of respect that we take up a book in which an earnest thinker expresses his views which embody a life's work, — the work of the author's mind in settling the puzzling questions that offer themselves at one time or another to every man; and the work of the subjects that have occupied him for

years and years upon the evolution of his mind. For it cannot be but that the latter influence makes certain points of view more important to one man's mind than to that of another, and accordingly their final conclusions will differ either fundamentally, or at least to a certain extent. It is therefore not with the expectation that we will find *the* truth in a book setting forth the opinions of a man — for we doubt whether such truth exists — that we read a book of this kind, but it is the æsthetical and ethical pleasure we look for in listening to opinions that are true to one principle, and therefore consistent. It is with this feeling that we read Professor LeConte's book with the greatest interest and gratification.

His explanation of evolution in the introductory chapter opens a clear view to his thoughts: "Every system of correlated parts may be studied from two points of view, which give rise to two departments of science. The one concerns changes within the system by action and re-action between the parts, producing equilibrium and stability; the other concerns the progressive movement of the system, as a whole, to higher and higher conditions. . . . The one concerns things as they are, the other the process by which they become so." This idea has been expressed by other writers by the words, 'evolution is part of the science of history as opposed to the science of physics.' The author then proceeds to define evolution, which he calls "a progressive change according to certain laws by means of resident forces." It is not the object of this review to follow the author in his argument for proving the truth of evolution in the sense as here described. Neither is this argument the principal object of the book, which is an explanation of the relation of evolution to religious thought. The author emphasizes justly that by accepting the law of evolution we do not become materialists any more than by accepting the law of gravitation. In setting forth his views as to the relation of man to nature, he assumes physical and psychical phenomena as equally true, but their connection as only intelligible to an intelligence superior to that of man. He believes that in man physical changes may be produced by psychical changes, while in animals only the reverse is the case. His views on the relation of God to man are an attempt to reconcile the theological and positivistic views — as we should say, instead of LeConte's materialistic — from the standpoint that both contain some truth, and that God is immanent in nature. These conclusions are as much dictated by feeling as by reasoning, and therefore they will be convincing and satisfactory to some men, while they cannot claim to be as firmly founded as the results of scientific investigations.

Accidents and Emergencies. By CHARLES W. DULLES, M.D. 3d ed. Philadelphia, Blakiston. 16°. 75 cents.

IN the preface to this edition the author says that whoever has seen how invaluable, in the presence of accident, is the man or woman with a cool head, a steady hand, and some knowledge of what is best to be done, will not fail to appreciate the desirability of possessing these qualifications. To have them in an emergency, one must acquire them before it arises, and it is with the hope of aiding any who wish to prepare themselves for such demands upon their own resources that the suggestions contained in the book have been put together. They cannot take the place of calling a physician or surgeon, but may fill up with helpful action what might otherwise be a period of inaction and despair before skilled assistance arrives.

Among the many topics treated are drowning, suffocation, choking, foreign bodies in the eye, nose, and ear, fits, sunstroke, sprains, dislocations, fractures, wounds, hemorrhage, poisons, etc. The book also contains a list of the supplies which are necessary to meet such emergencies as are liable to arise in every family, and gives the doses and uses of the medicines commonly found in the family medicine-chest. The illustrations are good and sufficiently numerous. In order to make this little treatise available for sudden necessity, pains have been taken to make the index as complete as possible, and the typography has been so arranged that leading words may catch the eye on every page. The language is simple, being entirely devoid of technicalities, and the methods of treatment recommended are trustworthy and reliable. The manual is one of the best of this class of books, and should be in the library of every householder, ready for reference at a moment's notice.

Practical Education. By CHARLES G. LELAND. London, Whitaker. 12°.

THIS is an essentially vicious book. In these days, when all enlightened educators are calling for meat, it is an outrage to offer them such a stone as this. It is the more vicious because it is offered in the guise of a contribution to the literature of the new education. Some things in it are good, many are nonsensical, and all are superficial. There is no grasp of education shown in it, no psychological power, and no connected account of any successful practical experience. The number of times that the words 'I,' 'my,' 'mine,' 'me,' etc., occur is sufficiently numerous — or sufficiently innumerable — to characterize the work. It contains no reference, at least no intelligent reference, to the manual-training movement which is revolutionizing the American schools and the traditional course of study. It offers no suggestions as to the co-ordination in various grades of schools of 'industrial-art education' and the ordinary studies.

We fear that the title of this book may commend it to the attention of many who are conscientiously studying contemporary educational thought. We warn such readers that Mr. Leland's book is superficial, that it is crude, that it is representative of no important educational movement. Some of the points on which the author touches are in themselves commendable, and have been taken up by other writers. When this has happened, they have usually been based on some educational principle. With the author of this book they seem to be mere 'flashes in the pan.' He has not discovered that an 'art-writer' and an 'educator' are not necessarily convertible terms.

NOTES AND NEWS.

THE first number of the journal of the American Folk-Lore Society, which was recently organized, has just been issued under the title *The Journal of American Folk-Lore*. It shows how much work may be accomplished by a society of this character, and that the establishment of a centre for collecting the fast-vanishing remains of American lore was a necessity. The journal is devoted to the study of the relics of Old English lore, as well as to that of the Indians, negroes, and other immigrants, and the first number contains articles on each of these subjects. Prof. T. F. Crane contributes a paper on the theory of the diffusion of popular tales, while H. Carrington Bolton gives an interesting collection of the counting-out rhymes of children. The general editor, Mr. W. W. Newell, studies the alleged Vaudoux (Voodoo) worship and child-sacrifice in Hayti, and arrives at the conclusion that it is the old superstition regarding the Waldenses that has been transplanted to America. The Vaudoux of Hayti are the Waldenses of France, the word having been introduced in the seventeenth century; and the alleged practices of the latter are now ascribed to the Vaudoux. The second half of the volume is devoted to Indian lore. Dr. D. G. Brinton gives some remarks on the Lenâpé, Rev. W. M. Beauchamp relates tales of the Onondaga, while Rev. J. Owen Dorsey and Dr. F. Boas have articles on myths and customs of Dakota and British Columbian tribes. Much interesting and valuable information has been collected in the 'Folk-Lore Scrap-Book,' and students will find the bibliographical notes very useful. The first number of the journal augurs well for the development and usefulness of the society.

— Records of about 3,500 orders received by A. A. Marks, New York, for an artificial arm or leg are found sufficiently full to enable them to be tabulated for statistical purposes. Of all the artificial limbs made by the firm, 85 per cent are legs, and 15 per cent arms. This small percentage for arms may be explained by the fact that fewer persons who have lost their arms supply themselves with artificials than those who have lost their lower extremities, inasmuch as it is easier for a man to go through this world with one arm than with one leg; and, besides, an artificial arm for amputation above the elbow is of so little service, aside from appearance, that few persons with amputations above the elbow ever use them. Taking these facts into consideration, the percentages referring to arms cannot be regarded of very much value in estimating the comparative restorations of the upper and lower extremities. Of all the legs taken into consideration, 49 per cent are right, 46 per cent are left, and 5

per cent both. The above figures show that the proportion of right legs amputated to left is nearly even, with the small difference of three per cent in favor of the right. Seventy-eight per cent of legs amputated are of males, and twenty-two per cent of females. The proportion for double amputations of males is nearly double that of females. This may be explained by the fact that males are more frequently placed in jeopardy than females. Over one-half of all the amputations are between the knee and ankle, with a larger percentage for males. Of all the arms manufactured by the firm, ninety-two per cent are for males, and eight per cent for females.

— A. H. Worthen, State geologist of Illinois, is dead.

— Mrs. Emma W. Hayden has given to the Academy of Natural Sciences of Philadelphia, in trust, the sum of twenty-five hundred dollars, to be known as the Hayden Memorial Geological Fund, in commemoration of her husband, the late Prof. Ferdinand V. Hayden, LL.D. According to the terms of the trust, a bronze medal, and the balance of the interest arising from the fund, are to be awarded annually for the best publication, exploration, discovery, or research in the sciences of geology and paleontology, or in such particular branches thereof as may be designated. The award, and all matters connected therewith, are to be determined by a committee to be selected in an appropriate manner by the academy. The recognition is not to be confined to American naturalists.

— Two living buffaloes, the gift of Fish Commissioner Blackford of this city have been added to the small collection of animals gathered in the Smithsonian grounds in Washington during the past few months. A bill has already been introduced into Congress for the purchase of a large tract of the beautiful suburban lands lying along Rock Creek, just outside of the city limits of Washington, and the establishment upon it of a government zoölogical garden. The bill may not be passed this year, but the few living animals now in possession of the National Museum are no doubt the nucleus of what will in a few years be a very important national zoölogical collection. Professor Hornaday has been made curator of living animals.

— An exhibition of the first year's industrial work in the Washington public schools will be given at the close of the present month. Professor Powell, the superintendent, does not expect to make as brilliant a display as that recently made in Philadelphia, and in other cities where manual training was introduced earlier; but he will show astonishing results, when it is considered that only five thousand dollars has been spent in fitting up shops and cooking-schools, and a year's expenses, including materials used, and that the pupils whose work will be exhibited have had instruction only one hour a week for a year.

— A geographical society has been formed in Peru for the purpose of collecting and publishing information regarding Peru. The society, which will be known by the name 'Geographical Society of Lima,' counts a number of eminent explorers and scientists of South America among its founding members.

— The Government of Ontario is about to take more energetic measures for the development of its mines, and as a preliminary step has appointed a royal commission to inquire into and report upon the subject. Members of the commission are Dr. R. Bell of the Canadian Geological Survey; W. H. Merritt, mining engineer; W. Coe, proprietor of the Madoc iron-mines; and A. Blue, deputy minister of agriculture; while John Charlton is chairman.

LETTERS TO THE EDITOR.

* * Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.

Twenty copies of the number containing his communication will be furnished free to any correspondent on request.

The editor will be glad to publish any queries consonant with the character of the journal.

Is the Rainfall increasing on the Plains?

MR. CURTIS does a service in calling attention to the serious error in the rainfall record of Fort Leavenworth for January, 1871 and 1872. It is to be hoped that any errors of this kind will be similarly pointed out.

The data on secular variation in rainfall, p. 19, *Monthly Weather Review* for April, 1887, show, however, that, even with these errors corrected, the rainfall at Leavenworth for the past twenty-five years has been considerably greater than for the previous twenty-five years. There is no doubt that material errors existed in the old records, some of which are due to neglect or falsification of records, while others, as in this case, are due to gross carelessness.

Rainfall data are now being collated by the Signal Office with a view to their examination and discussion; but the more the records are examined, the more possible it seems that observations prior to 1870 should be neglected, except in cases of well-known and reliable observers.

A. W. GREELY.

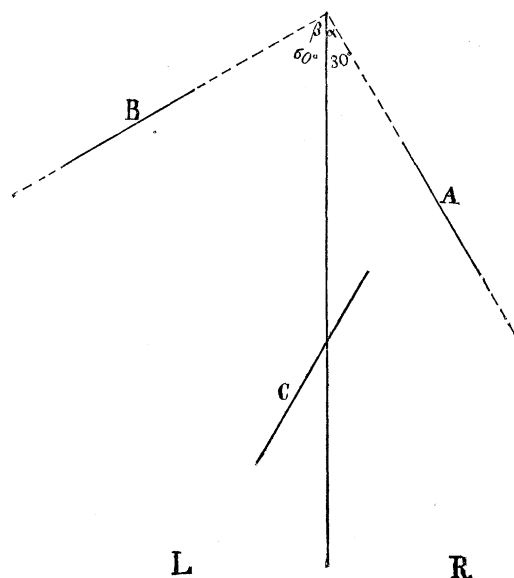
Washington, D.C., May 12.

Disparate Vision.

MR. HYSLOP'S experiments in physiological optics as detailed in *Science*, Nos. 261, 262, and 274, are interesting in that they show the importance of monocular perceptions in attaining what we may think to be binocular effects, even though they may not fully disprove the generally accepted theory of corresponding retinal points. Having devoted much time to this subject (see *American Journal of Science* for November and December, 1881, March, April, May, October, and November, 1882), I may perhaps claim some practice in experiments of this kind. The result of former investigations was my total abandonment of the geometric considerations which formed an integral part of Brewster's theory of binocular vision, and which have been repeated time and again since his day. The empiristic theory, as developed by Helmholtz, seems more consistent with the more general theory of evolution now universally accepted as fundamental in biology. According to this, we rapidly learn in infancy to interpret our binocular perceptions by experience that is too complex for analysis. Assuming a certain inherited structure for the retina, which is alike for the majority of individuals of the race, it remains possible to modify our perceptions slightly by training; and it would not be safe to deny that in exceptional cases binocular perceptions may result from simultaneous impressions on retinal points that are decidedly disparate. I have elsewhere adduced arguments to show that no strictly mathematical interpretation can be put upon the theory of corresponding points (*American Journal of Science*, May, 1882, p. 355 *et seq.*). The perception of the third dimension in space without any of the aids resulting from shading, comparison, or motion, has lately been shown to be quite possible with monocular vision alone (*American Journal of Psychology*, November, 1887, p. 99, article on the Horopter, by Mrs. Franklin). I had no difficulty in attaining this monocular perception in repeating Mrs. Franklin's experiments.

But although constrained to assign much greater potency to monocular vision than was customary after the stereoscope became generally known and used, and although our interpretation of binocular perception has to be much more elastic than it formerly was, there seems to be not yet sufficient ground for the belief that any large part of our binocular perceptions are the result of impression on pairs of retinal points that are widely disparate. The same perception may be changed by force of will or of imagination, and with various degrees of success by the same person at different times. Without denying the validity of Mr. Hyslop's perceptions, I do not succeed in getting exactly his results. Combining the two circles by either convergent or divergent vision, the binocular effect is an ellipse whose plane is perpendicular to the meridian plane only when their inclinations to this plane are equal. This perception is rigidly binocular. Let, now, their inclinations be different. For example: let the plane of the circle *A* make an angle of 30° with the meridian plane, and *B* an angle of 60° , the two being seen by cross-vision. In the accompanying diagram the cards are supposed to be seen edgewise, the two eyes being at *R* and *L*. The plane of the resultant ellipse changes about to the position *C*; the horizontal axis, which was previously the shorter one, becoming now much longer than the vertical axis, which has remained unchanged. The projection of the circle *A* on the retina *L* is quite a narrow ellipse, while that of *B* on the retina *R* is almost if not quite circular, the vertical diameters of these ellipses being nearly equal. At the top and bottom of the resultant ellipse the perception may be due to impression on corresponding

retinal points, while for other parts the impression is on disparate points. Very little attention is required to perceive the separate monocular images. By still further diminishing the angle α and increasing β , a limit is reached at which binocular fusion ceases to be possible. Two ellipses are seen, apparently crossing each other in space about where *C* was; the plane of one being nearly parallel to *A*, and that of the other nearly parallel to *B*. By indirect monocular vision, *A* is still seen by the right eye, and *B* by the left. The locality of the crossed ellipses is not so definite as was that of the binocular ellipse; but the illusion of suspension in space still remains, and with it is the monocular perception of the third dimension in space. Even when α is very nearly equal to β , it is possible by rivalry of retinal impressions to gain or lose monocular perceptions alternately with binocular resultants. But the clearness of the binocular illusions is more pronounced than that of the monocular in proportion as the separation of the disparate points impressed becomes less. It is fair to conclude that binocular vision is at its best when there is perfect correspondence of at least a goodly proportion of the retinal points impressed, and but slight separation of disparate points. But it is quite necessary, in the majority of cases, that there shall be some such disparateness. The mental effect produced is instantaneous. Since double images, whether homonymous or heteronymous, are rarely ever perceived except as



the result of special ocular training, and since the binocular perception of depth in space may result where one element may, on geometric grounds, be considered to be combined with other elements: so as to produce at the same instant both homonymous and heteronymous double images (*American Journal of Science*, October, 1882, p. 5), binocular vision is far from being so simple and easy of explanation as it seemed to the students of forty years ago.

W. LECONTE STEVENS.

Brooklyn, N.Y., May 5.

Agriculture and Late Quaternary Geology.

IN view of the effort now being made to endow the United States Geological Survey with the means of carrying into effect the "classification of lands" called for in the act creating it, it may be of interest to record one out of many instances where this classification, in connection with agricultural phenomena, affords information equally interesting to the geologist and the farmer.

At a late visit to the upper San Joaquin valley for the purpose of locating on a representative soil a culture experiment station under the Hatch Act, the writer was under the necessity of obtaining a cross-section of the great valley in the latitude of Tulare City, from Lake Tulare on the west, to the foot-hills of the Sierra Nevada on the east.

The dark-tinted loam-deposits at present forming on the edge of that lake being already familiar, it was easy to recognize in the 'black-lands' belt, that begins about two miles westward of the

Southern Pacific Railroad (here running midway between the Sierra and the lake), the earliest border of that basin, distant quite fourteen miles from the lake-shore as recorded on the maps, but which itself is now several miles inland from the water's edge. The railroad and Tulare City lie on a belt of sandy land, obviously somewhat higher in level than the 'black lands,' and here about eight miles wide. In crossing this belt to the eastward we traverse several bands of 'alkali land,' characterized by the dense growth of *Brizopyrum*, or 'alkali-grass,' and evidently forming a summit plateau on the divide between the Tulare basin proper and the extreme southern branch of the delta bayous¹ of the Kaweah River, called 'Outside Creek,' or Elk Bayou. Approaching this water-course, we again come to a 'black-lands' belt, about three miles wide, which borders the bayou on both sides, and evidently represents an estuary of the time when Tulare Lake was much higher than now, and the Kaweah delta bayous were mere swamps. Another 'alkali-land' belt is crossed after traversing the 'black-lands' of Outside Creek, towards the foot-hills: beyond these, lies a narrow sandy belt corresponding to that along the railroad, as above described. Then, at a distance of some eight miles from the foot-hills, the color of the soil begins to change toward the well-known red tint of the soils resulting from the decomposition of the 'bedrock' slates of the foot-hills; but the ascent is so gradual that to the eye the plain appears as level as ever, although the presence of the ferric hydrate in the soil proves that these 'red lands' were never submerged for any great length of time, since otherwise their iron would have been reduced and leached out, or gathered into 'black gravel' (bog-ore), as is the case in the 'black lands' of the lake and bayou borders. On inquiry, it was learned that all the larger streams of the region (including Tule River and Deer Creek, outside of the Kaweah delta) are accompanied by belts of such 'black land.'

Besides these main bayous, there appear in the sandy lands a few obvious sandy channels, usually dry, but carrying water in time of flood.

But a curious and at present very striking demonstration of the ancient drainage system of the region may be seen in the grain-fields. In consequence of the failure of the usual April rains, most of the wheat-fields of the region are now in a very precarious condition where not irrigated, and much of the wheat sown will not even make hay. Its condition is best on the 'black lands,' and in certain portions of the sandy belt that do not show any obvious difference in soil from adjoining tracts in which the crop is already dried up without having been able to form grain in the ears. The eye quickly recognizes the extraordinary resemblance of the outlines of the dead portions to meandering water-channels, but no difference of surface-level remains to indicate the fact. But, by digging in any part of these meandering belts of desolation, we find the sandy soil becoming sandier as we descend, until finally, at about three feet depth, an almost pure, coarse sand underlies, which obviously cannot raise moisture within reach of the root system. On the adjacent land, where the wheat is still green and growing, we find at the same depth a subsoil of increased closeness and capillary power, which keeps the moisture below within reach of the roots.

Thus a bird's-eye-view photograph taken of this region now, would show, traced out in minute detail by the color-contrast between the living and the dead grain, the ancient drainage of the country, of which its surface at present shows no indication, together with the broad bands of the ancient estuaries that have formed the 'black lands,' characterized by green, growing grain or an extraordinarily luxuriant growth of oaks, that likewise outlines the ancient margin of Lake Tulare.

We thus obtain a chapter of the geological history of the valley from a mere reconnaissance such as any one desiring to invest in its lands would need to make. The significance of the 'alkali lands' in both points of view remains for a future discussion.

It is hardly necessary to dwell upon the interest attaching to the study of these features, whether from a practical or a purely scientific standpoint.

¹ It should be understood that the Kaweah River, emerging from a cañon of the Sierra next to southward of King's River, divides into a number of forks or bayous immediately upon entering the valley plain. The extensive delta region thus formed is one of the richest, as well as the only forest-grown area of the great valley of California.

One point, however, should be specially noted; namely, that a great many of the characteristic marks of these late quaternary events are rapidly disappearing before the advance of cultivation, and the replacement of the native plant-growth (the result of secular co-adaptation of soils and plants) and of the natural surface by the well-known results of agricultural operations. The latter are already obliterating, on large tracts, the singular 'hog-wallow' mounds that form so striking a feature and so difficult a problem, the solution of which must largely depend upon the geographical distribution of these swarms of mammillary elevations.

It is hard to see on what ground the study of these latest phenomena, connecting the present with the immediate geological past, should be deferred until it is too late to complete the record, by giving precedence altogether to the ancient formations. The rocks and fossils of the older formations will remain undisturbed for ages, as in the past, awaiting the leisure of the student of geology; while the delicate tracings of the latest pre-modern epochs are liable to fade away rapidly before the advancing settlement of the country. Nor can it be maintained that the processes that gave them birth, and which are still active in the formation of soils, are not scientifically, as well as practically, at least of equal interest with those that formed the older rocks. It is true that their study does not offer the easy rewards of the naming of new fossils, minerals, and rocks, which in times not yet belonging to the far past seemed to be the chief aim of students of geology; but they are none the less worthy of the highest scientific effort, and their practical results bear on products of an importance at least as great as those of the richest mines.

E. W. HILGARD.

Berkeley, Cal., May 1.

Queries.

32. HUMAN BEINGS AS PACK-ANIMALS.—In studying the history of transportation, I have ascertained that the first pack-animals were human beings, — men and women. Long before any of the animals were domesticated as beasts of burden, there were common carriers moving vast quantities of merchandise about the world. They toted (carried on the head); they hung great loads to their foreheads by means of a strap connected with a pack, wallet, basket, or frame on the back; they 'shouldered' their burdens, with or without yokes, front and rear, on one shoulder (like the Chinese) or on both shoulders (like the Dutch); they strapped their primitive knapsacks to their shoulders; they harnessed themselves to a load, as they did afterwards dogs, reindeer, horses, etc. Now, I should also like to know how much a man can tote, how much a woman can tote, and how long a time, without resting, the toting may go on. I should also like to know how much a man or a woman can carry in any particular manner, and how long a time the operation can be kept up without resting. The weight multiplied by the time will give a rough unit of human endurance. I shall be extremely obliged to any one who will give me valuable information on this subject.

O. T. MASON.

Washington, D.C., May 10.

Answers.

22. WASP-STINGS.—It is a fact not generally known, that, if one holds his breath, wasps, bees, and hornets can be handled with impunity. The skin becomes sting-proof, and holding the insect by the feet, and giving her full liberty of action, you can see her drive her weapon against the impenetrable surface with a force that lifts her body with every stroke; but, let the smallest quantity of air escape from the lungs, and the sting will penetrate at once. I have never seen an exception to this in twenty-five years' observation. I have taught young ladies with very delicate hands to astonish their friends by the performance of this feat; and I saw one so severely stung as to require the services of a physician, through laughing at a witty remark of her sister, forgetting that laughing required breath. For a theory in explanation, I am led to believe that holding the breath partially closes the pores of the skin. My experiments in that direction have not been exact enough to be of any scientific value, but I am satisfied that it very sensibly affects the amount of insensible perspiration.

W. L. WILDER.

Somerville, Mass., May 7.